

REMARKS

The Examiner is thanked for the thorough examination of this application. Applicants hereby affirm the election of claims 29-36, and have canceled claims 1-28 herein. Claims 29-32 and 36 have been amended. Claim 35 has been canceled. Claims 37 and 38 have been added. Accordingly, claims 29-34 and 26-38 remain pending in this application and reconsideration of these claims is respectfully requested.

Applicants have amended claim 29 to more clearly define a novel and non-obvious feature of an embodiment of the claimed invention. First, the element “a substrate, active semiconductor devices having been created in or over said substrate” is replaced by “a semiconductor surface”. Support for this feature can be found at least on pages 13 of the application and FIG.5. Next, the element “a surface area of the patterned layer of UBM being limited to a size no larger than a size of a surface area of the at least one contact pad” in lines 11-13 is replaced by “lateral dimension of the UBM layer being limited to be within a lateral dimension of the at least one contact pad”. Support for this feature can be found at least in FIG.11. Further, the following feature has been added to claim 29: “the solder compound comprising an approximately flat top surface and convex sidewalls before connecting to other circuits or system components”. Support for this feature can be found at least in FIG. 12. Applicants submit that these amendments add no new matter to this application. As a result of the foregoing amendments to claim 29, the objection and rejection of that claim is rendered moot. Therefore, independent claim 29 (and dependent claims 30-34 and 36) patently define over the cited art of record.

In addition, Applicants have amended claim 36 as suggested by the Examiner, and thus, objection to claim 36 has been accommodated and should be withdrawn.

In claim 34, antecedent basis for “said semiconductor surface” is added to amended claim 29, and the description of “a semiconductor device ...” in lines 3-4 is supported by the paragraph in page 13, lines 13-15 of the application. Thus, the objection to claim 34 is moot.

Applicants have added new claim 37, which defines a novel and non-obvious feature (e.g., “lateral dimension of the patterned layer of UBM being limited to a size approximately the same as lateral dimension of a lateral dimension of the at least one contact pad”) of an embodiment of the invention. Support for this limitation can be found at least on pages 22, lines 7-8 of the application and in FIGS. 11 and 12. Accordingly, the addition of this claim adds no new matter to the application.

Applicants have also added new claim 38. The new claim 37 clearly identifies a novel and non-obvious feature (e.g., “the solder compound comprising an approximately flat top surface and convex sidewalls before connecting to other circuits or system components”) of an embodiment of the invention. Support for this limitation can be found at least in FIG. 12. A Accordingly, the addition of this claim adds no new matter to the application.

35 U.S.C. 102(b)

Claims 29-36 stand rejected under 35 U.S.C 102(b) as allegedly unpatentable over Beddingfield (U.S. Patent No. 5,977,632). Applicants respectfully traverses the rejections made by the Examiner for at least the additional reasons summarized below.

Amended claim 29 and new claim 38 recite the solder compound comprising an approximately flat top surface and convex sidewalls. This unique feature is to allow more solder can be deposited thereby creating a larger bump without creating a layer of UBM as the footprint of the solder bump. See page 22, lines 11-13.

Beddingfield appears to teach bump structures 26 and 28 with a **spherical feature**. Specifically, Beddingfield teaches bump structures 26 and 28 with a **spherical feature** before connecting to other circuits or system components (see e.g., Fig. 5). Further, Fig. 7 of Beddingfield appears to show a solder 40 comprising an approximately flat top surface and convex sidewalls **after** connecting to other circuits or system components (board 60), and the top surface of the solder 40 is flat resulting from the flat surface of the conductive contact 42 connecting thereto.

Significantly, Beddingfield does not teach or suggest the solder compound comprising an approximately flat top surface and convex sidewalls before connecting to other circuits or system components. Indeed, Beddingfield only teaches “bump structures 26 and 28 with **spherical feature before** connecting to other circuits or system components” and “solder 40 **after** connecting to other circuits or system components”. For at least this reason independent claims 29 and 38 are allowable over the cited references. Insofar as claims 30-34 and 36 depend from claim 29, these claims are also allowable.

New claim 37 recites the UBM layer being limited to a size approximately the same as a size of lateral dimension of the at least one contact pad. This unique feature is to prevent cracking (see e.g., page 22, line 8).

Beddingfield appears to teach the UBM layer being limited to a size larger than or smaller than a size of lateral dimension of the at least one contact pad. Specifically, Beddingfield teaches the UBM layer 24 being limited to a size smaller than a size of lateral dimension of the at least one contact pad 12, and the UBM layer 22 being limited to a size larger than a size of lateral dimension of the at least one contact pad 13. See Col. 3, lines 53-57 and Fig. 4 of Beddingfield.

Significantly, Beddingfield does not teach or suggest the UBM layer being limited to a size approximately the same as a size of lateral dimension of the at least one contact pad.

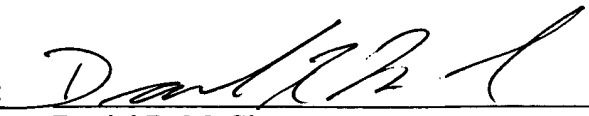
Indeed, Beddingfield only teaches "the UBM layer 24 being limited to a size smaller than a size of lateral dimension of the at least one contact pad 12, and the UBM layer 22 being limited to a size larger than a size of lateral dimension of the at least one contact pad 13". For at least this reason, new claim 37 is allowable over the cited references.

CONCLUSION

In view of the foregoing, it is believed that all pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

No fee is believed to be due in connection with this amendment and response to Office Action. If, however, any fee is believed to be due, you are hereby authorized to charge any such fee to deposit account No. 20-0778.

Respectfully submitted,

By: 
Daniel R. McClure
Registration No. 38,962

Thomas, Kayden, Horstemeyer & Risley, LLP
100 Galleria Pkwy, NW
Suite 1750
Atlanta, GA 30339
770-933-9500